

# Exercise Solutions for Math 20

## Linear, Quadratic, and Rational Equations

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# 1

## 1.1 Find the solution set of the following equations.

**1.1.a**  $x + 9 = 5 - 3x$

$$\Rightarrow x + 3x = 5 - 9$$

Solve for  $x$ .

$$\Rightarrow 4x = -4$$

$$\Rightarrow x = -1$$

■

**1.1.b**  $\frac{2x+3}{4} - \frac{x-1}{2} = -\frac{1}{3}$

$$\Rightarrow \frac{3(2x+3)}{12} - \frac{6(x-1)}{12} = -\frac{4}{12}$$

LCM = 12

$$\Rightarrow \frac{6x+9}{12} - \frac{6x-6}{12} = -\frac{4}{12}$$

$$\Rightarrow (6x + 9) - (6x - 6) = -4$$

$$\Rightarrow 6x + 9 - 6x + 6 = -4$$

$$\Rightarrow 15 = -4$$

$$\Rightarrow x = \emptyset$$

■

**1.1.c**  $3x^2 - 2x + 1 = 0$

$$\Rightarrow \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(1)}}{2(3)}$$

Use the quadratic formula.

$$\Rightarrow \frac{2 \pm \sqrt{-8}}{6}$$

$$\Rightarrow \frac{2 \pm \sqrt{4}\sqrt{-2}}{6}$$

$$\Rightarrow \frac{2 \pm 2i\sqrt{2}}{6}$$

$$\Rightarrow \frac{1 \pm i\sqrt{2}}{3}$$

$$\Rightarrow \frac{1}{3} \pm \frac{\sqrt{2}}{3}i$$

$$\Rightarrow x = \left\{ \frac{1}{3} + \frac{\sqrt{2}}{3}i, \frac{1}{3} - \frac{\sqrt{2}}{3}i \right\}$$

■

**1.1.d**  $4x^2 + 2x = 2$

$$\Rightarrow 4x^2 + 2x - 2 = 0$$

Rewrite in standard form.

$$\Rightarrow 2x^2 + x - 1 = 0$$

$$\Rightarrow 2x^2 + 2x - x - 1 = 0$$

Factor by grouping.

$$\Rightarrow 2x(x + 1) - 1(x + 1) = 0$$

$$\Rightarrow (2x - 1)(x + 1) = 0$$

$$\Rightarrow x = \{-1, \frac{1}{2}\}$$



**1.1.e**  $16x^2 + 9 = 24x$

$$\Rightarrow 16x^2 - 24x + 9 = 0$$

Rewrite in standard form.

$$\Rightarrow 16x^2 - 12x - 12x + 9 = 0$$

Factor by grouping.

$$\Rightarrow 4x(4x - 3) - 3(4x - 3) = 0$$

$$\Rightarrow (4x - 3)^2 = 0$$

$$\Rightarrow x = \frac{3}{4}$$

